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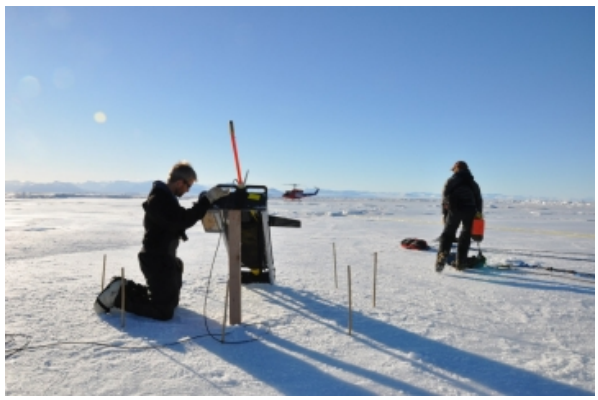
By Miasia Osbey (mailto:mosbey@odu.edu)

Antarctica is covered by miles-thick layers of ice that accumulated over 3 million years. However, warm water intrusion is now causing widespread ice melt and subsequently raising sea levels causing impacts in coastal regions like Hampton Roads half a world away.

Old Dominion University's Center for Coastal Physical Oceanography (CCPO) is analyzing ocean processes by which ocean water inundates the base of the floating ice sheets causing them to melt. The melting glaciers are impacting a third of the Hampton Roads' rising sea levels.



Mike Dinniman sets up an ocean glider to be deployed into the Ross Sea from the edge of the Ross ice shelf.

John Klinck, director of CCPO and professor in the Department of Ocean, Earth and Atmospheric Sciences and; research scientists, Mike Dinniman and Pierre St-Laurent from Old Dominion's Research Foundation, are using ocean circulation models to study warm water intrusions in three locations: the shelf west of the Antarctic Peninsula, the Ross Sea and in the Amundsen Sea.

"Numerical model studies allow a greater understanding of ocean processes responsible for glacier melt in this remote, hard to observe region," Klinck said.

Various glaciers in the Amundsen Sea are melting as much as 30 feet annually. Klinck added that the West Antarctic Ice Sheet is particularly troubling because ice is resting on bedrock that is below sea level.

"This allows ocean water to intrude under the ice sheet causing faster, more widespread, melting," he said. "This melting contributes greatly to our region, thus making it more common and more damaging."

Current global climate models do not include ice shelves, despite their critical nature, and cannot simulate sea level rise resulting from glacier-ocean interaction. Klinck and his team are helping to design ways to update those models to include melting ice shelves.

"The ocean activity creating the melting depends on small details that are not included in the current climate models. The issue is if we knew how much ice was sliding off the continent, and if we knew how much of that ice the ocean was melting, then we would have a good estimate of how much water Antarctica is adding to the ocean."

The Center for Coastal Physical Oceanography continues its interest in high latitude oceanography through a recently developed collaboration with ocean scientists in Chile. University alumni are actively assisting CCPO in training ODU and Chilean students to use computer models to study the ongoing ice melt issue in both the Antarctic and Sub-Antarctic regions.

"It is encouraging to know that CCPO scientists can equip the next generation of scientists with skills necessary to study these remote, but important, regions of the earth in order to better understand how to mitigate the threat of sea level rise," Klinck said.

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